Battery Electric Vehicles and Fuel Cell Vehicles:

Current and Future Consumer Choices

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ARB's ZEV Program Goals

- Achieve significant air quality benefits
- Push research, development and deployment of zero emission vehicles
- Encourage ZEV commercialization through introduction of ZEV-enabling technology

ZEV Program Achievements

- Over 30,000 ZEVs placed through 2006
  - 140 fuel cell vehicles
  - 4,400 battery EVs
  - 26,000 neighborhood EVs
- Widespread acceptance of hybrid electric vehicles (>100,000)
- Focused research and development of battery electric and fuel cell vehicles

Zero Emission Vehicles

- Battery Electric Vehicles
  - Electricity from grid or “off-grid” (solar)
  - Vehicle types range from low speed Neighborhood EVs to full-function sports cars
- Fuel Cell Vehicles
  - Hydrogen + oxygen produces electricity for motive power
  - Conventional vehicle builds

Vehicle Energy Management Comparison

	Battery EV	Fuel Cell Vehicle	Gasoline Vehicle
Refueling time	hours	minutes	minutes
Vehicle range	25 to >200 miles	>200 miles	>200 miles

Battery EV Types

- Neighborhood EV
  - Low speed (25mph), range up to 30 miles
- City EV
  - Higher speeds (60mph), range up to 100 miles
- Full Function EV
  - Freeway capable, range up to 200 miles
- Zero Emission Motorcycle
  - Up to 60mph, range 25-50 miles

Battery EV Examples

Fuel Cell Vehicles

- Honda FCX Clarity
- Chevrolet Equinox
- Ford, Daimler, Toyota, Hyundai/Kia Nissan, Volkswagen

ZEV Availability

- NEVs, motorcycles, full function vehicles currently available, more to be introduced (Tesla sedan 2010)
- City EVs anticipated in 2008 (Mitsubishi), 2010 (Nissan), and beyond
- Fuel Cell Vehicles in leases (Honda) and consumer demos (GM)

ZEV Purchase

- Battery EVs ~$10,000 - $100,000
- Fuel Cell Vehicles not available for purchase yet
- Difficult to estimate fueling costs
  - Electricity costs vary among utilities
  - Hydrogen will be comparable to other fuels
- Incentive funds available for vehicle purchase/lease

ZEV Challenges

- Development essential for future commercialization
  - Energy storage (batteries, tanks)
- Fueling infrastructure (electricity, hydrogen) in step with vehicle introductions
- Improvements will continue to lower vehicle costs

Conclusions

- ZEVs are available now, increasing choices in the future
- Air quality benefits associated with ZEVs are considerable
- Consider transportation needs when selecting a vehicle

Additional Information

ARB's Zero Emission Program

http://www.arb.ca.gov/msprog/zevprog/zevprog.htm

DriveClean Website

http://www.driveClean.ca.gov

California Fuel Cell Partnership

http://www.cafpc.org

California Center for Sustainable Energy

http://www.energycenter.org/ContentPage.asp?ContentID=473&SectionID=508